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Yan et al.

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(54) **CABLE MANAGEMENT DEVICE**

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B65H 75/40 (2006.01)
B65H 75/44 (2006.01)

(52) **U.S. Cl.**
CPC ***B65H 75/406*** (2013.01); ***B65H 75/4423*** (2013.01); *B65H 2701/537* (2013.01)

(58) **Field of Classification Search**
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USPC 242/378, 378.1–378.4
See application file for complete search history.

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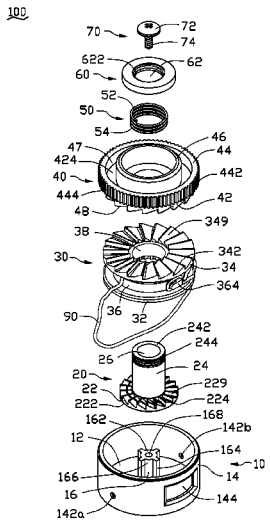
(57) **ABSTRACT**

A cable management device includes a base, a locking member, a winding member, a driving member, a pressing member, and a spring. The base comprises a bottom board and a guide member. The locking member includes a pedestal and a sleeve. The winding member includes a winding portion sandwiched between a first end and a second end. The winding member defines a first receiving hole for receiving the sleeve. A number of first sawteeth formed on the pedestal mesh with a number of second sawteeth formed on the first end. The driving member includes a plate and a second receiving hole passing through the plate for receiving the sleeve. A number of third sawteeth formed on the second end mesh with a number of fourth sawteeth formed on the plate. The pressing member is connected to the sleeve. The spring is compressed between the pressing member and the driving member.

14 Claims, 9 Drawing Sheets



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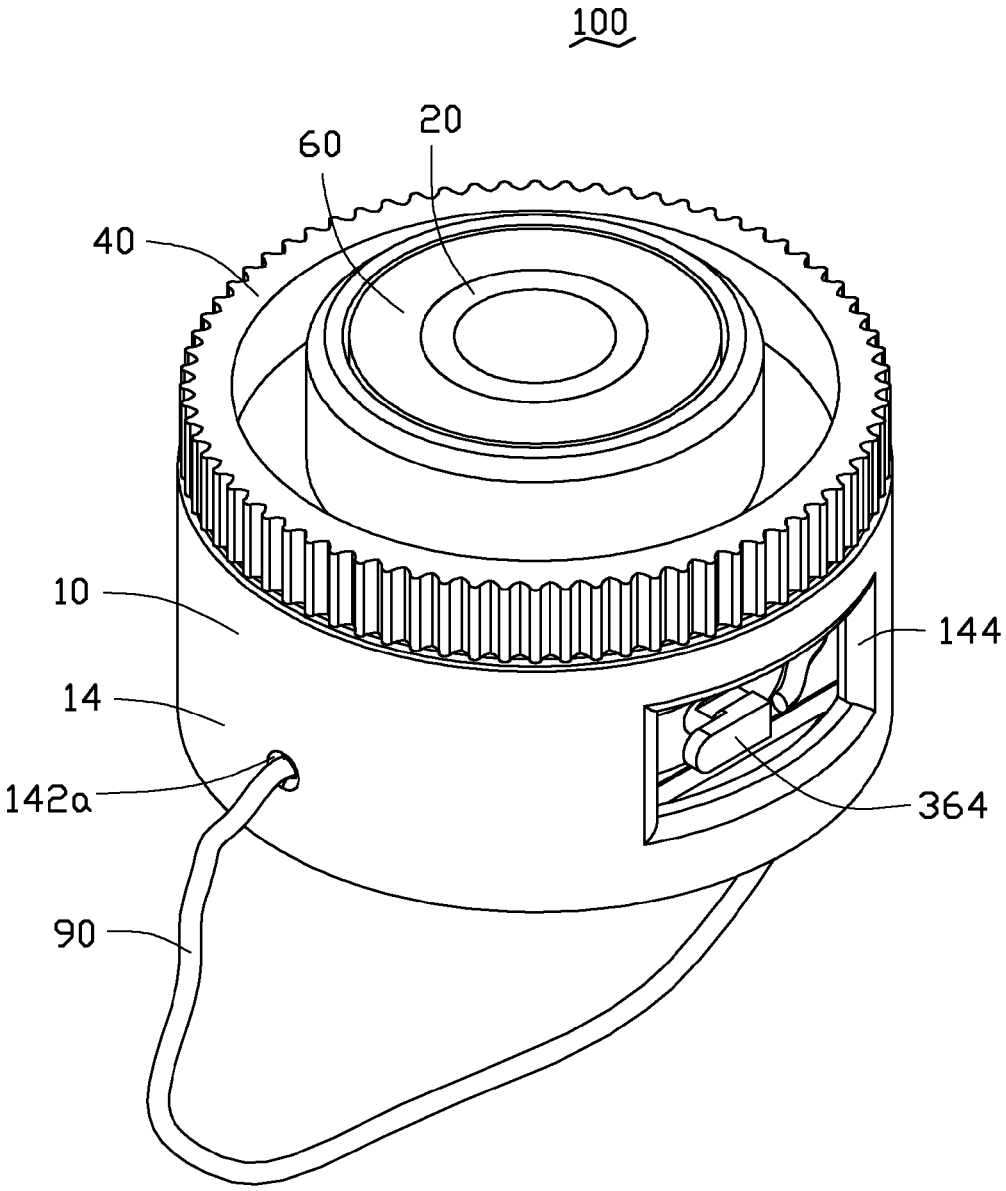


FIG. 1

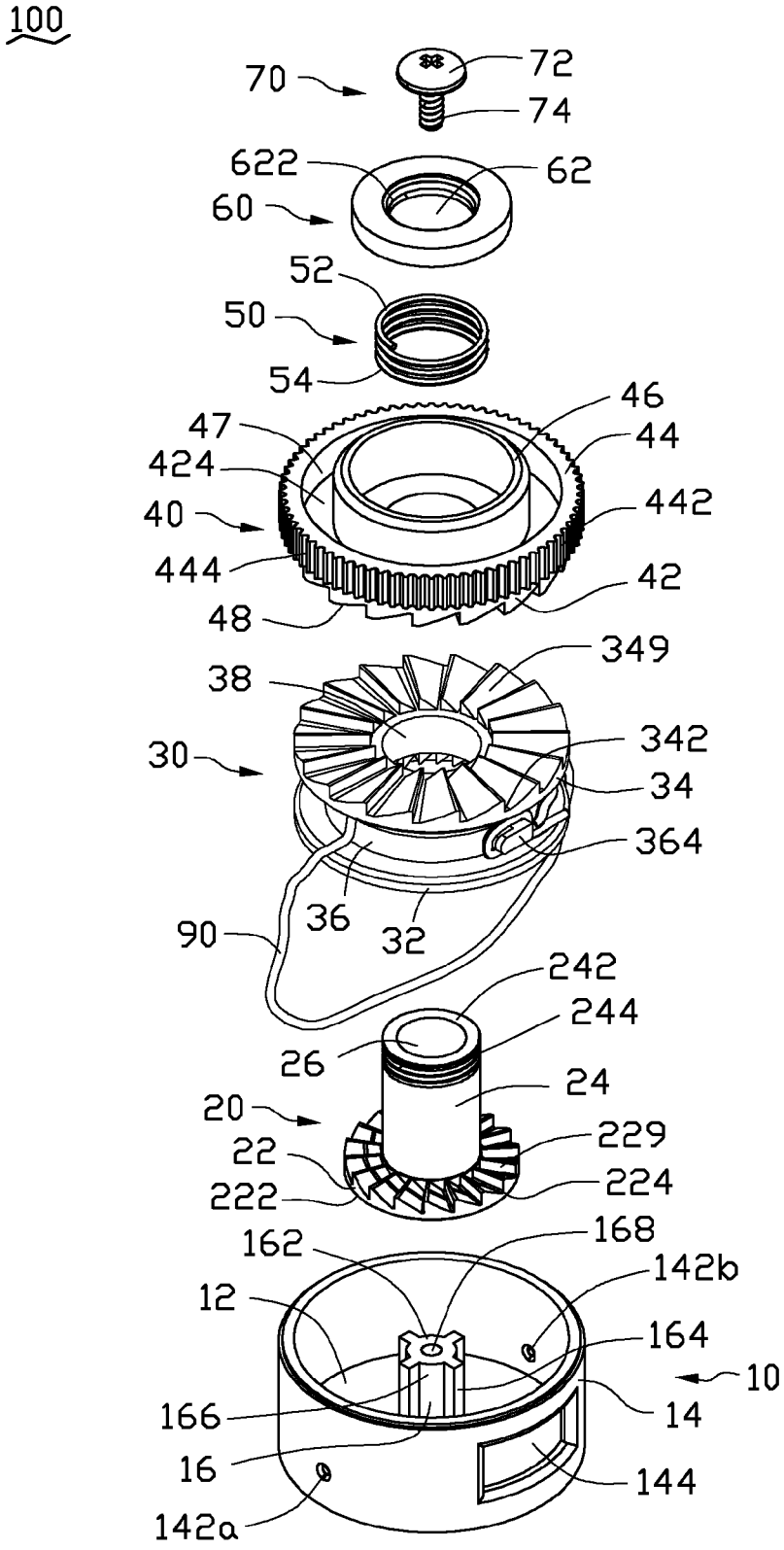
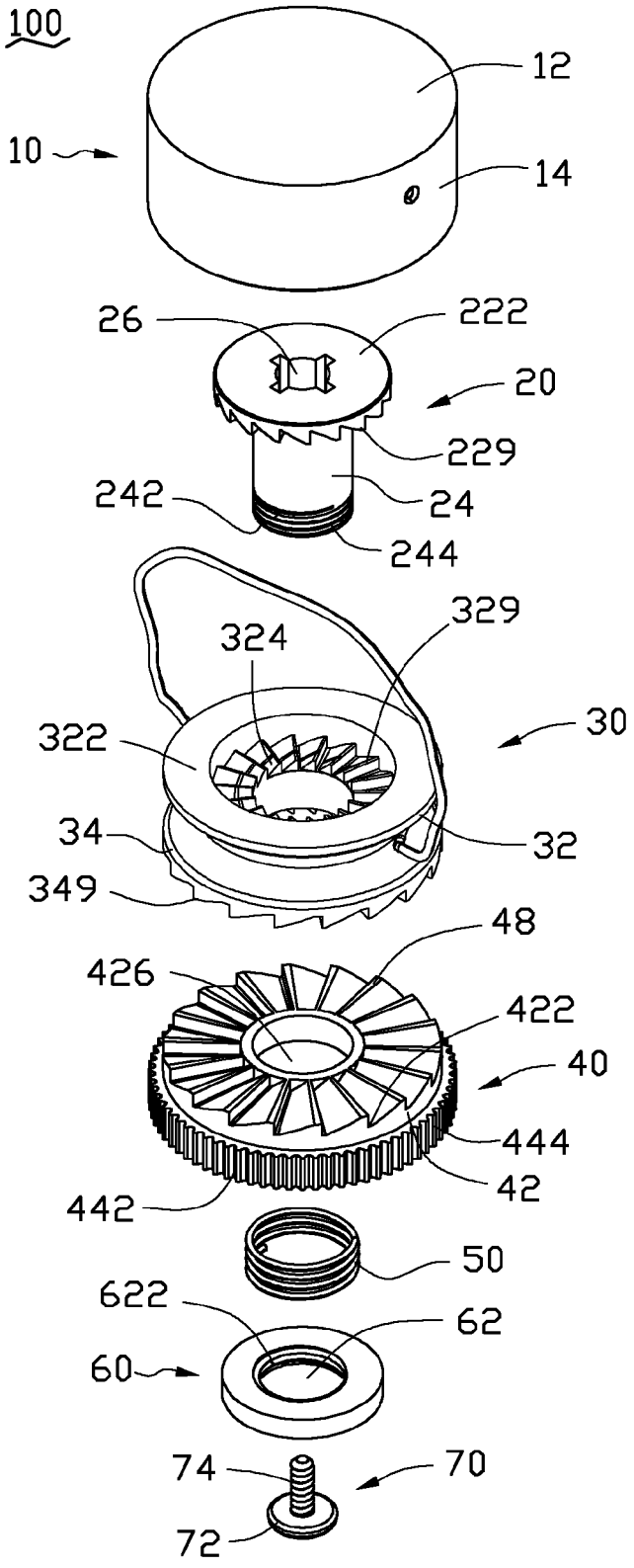

100
70
72
74
622
62
60
52
50
54
46
47
44
424
442
40
444
42
48
349
38
342
30
34
364
36
32
90
242
244
26
24
20
229
22
224
222
168
162
142b
12
164
10
166
14
16
144
142a

FIG. 2


100
12
10
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26
222
20
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244
329
324
322
30
34
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48
426
422
40
444
42
442
50
622
62
60
74
70
72

FIG. 3

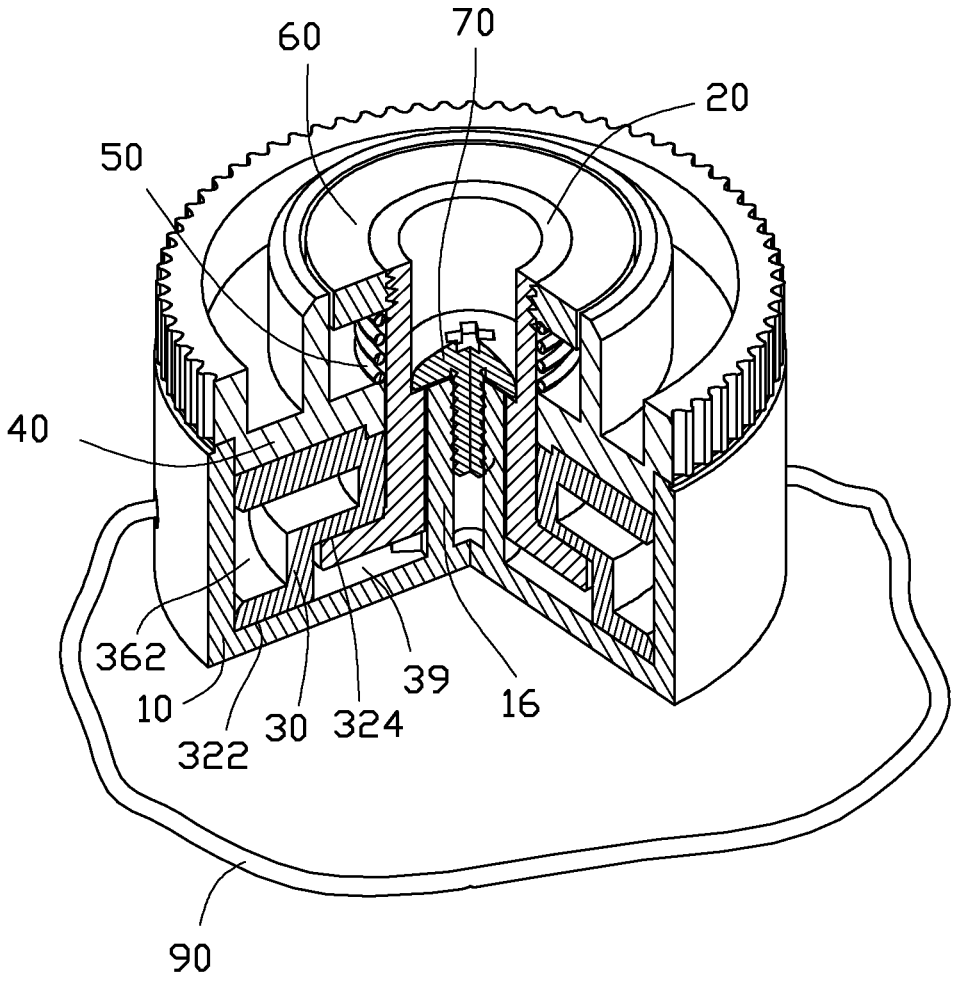

FIG. 4

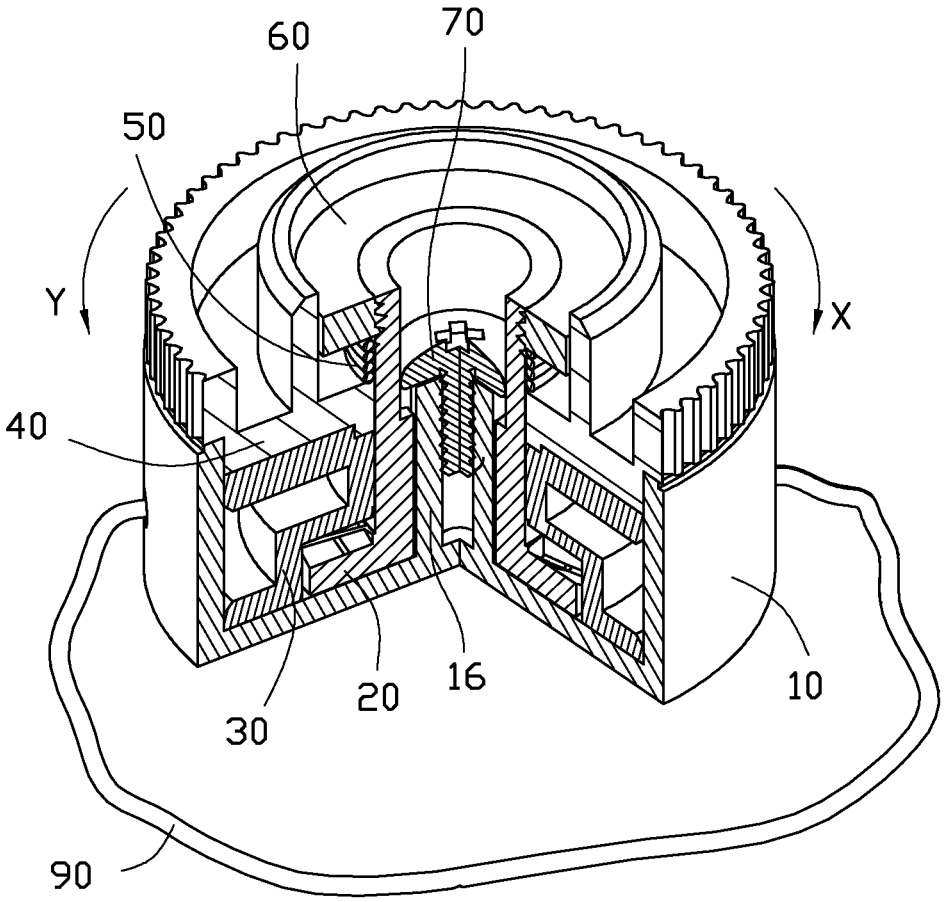

FIG. 5

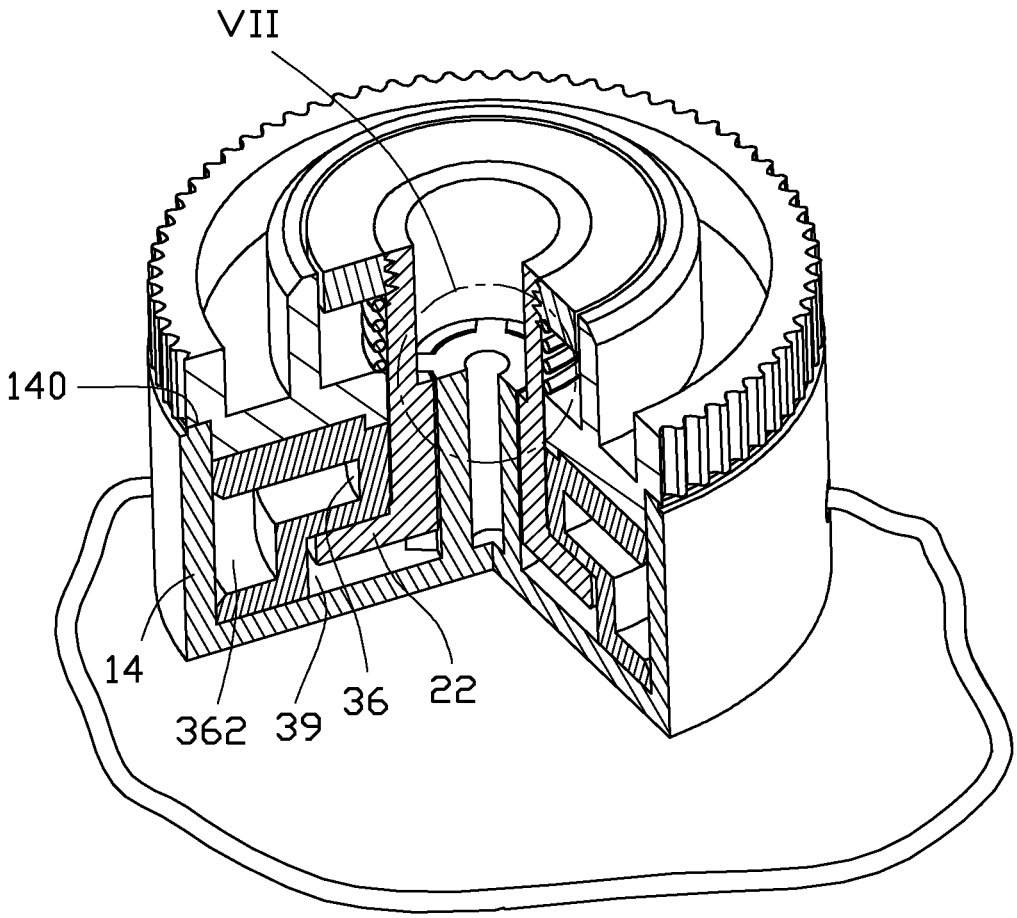

FIG. 6

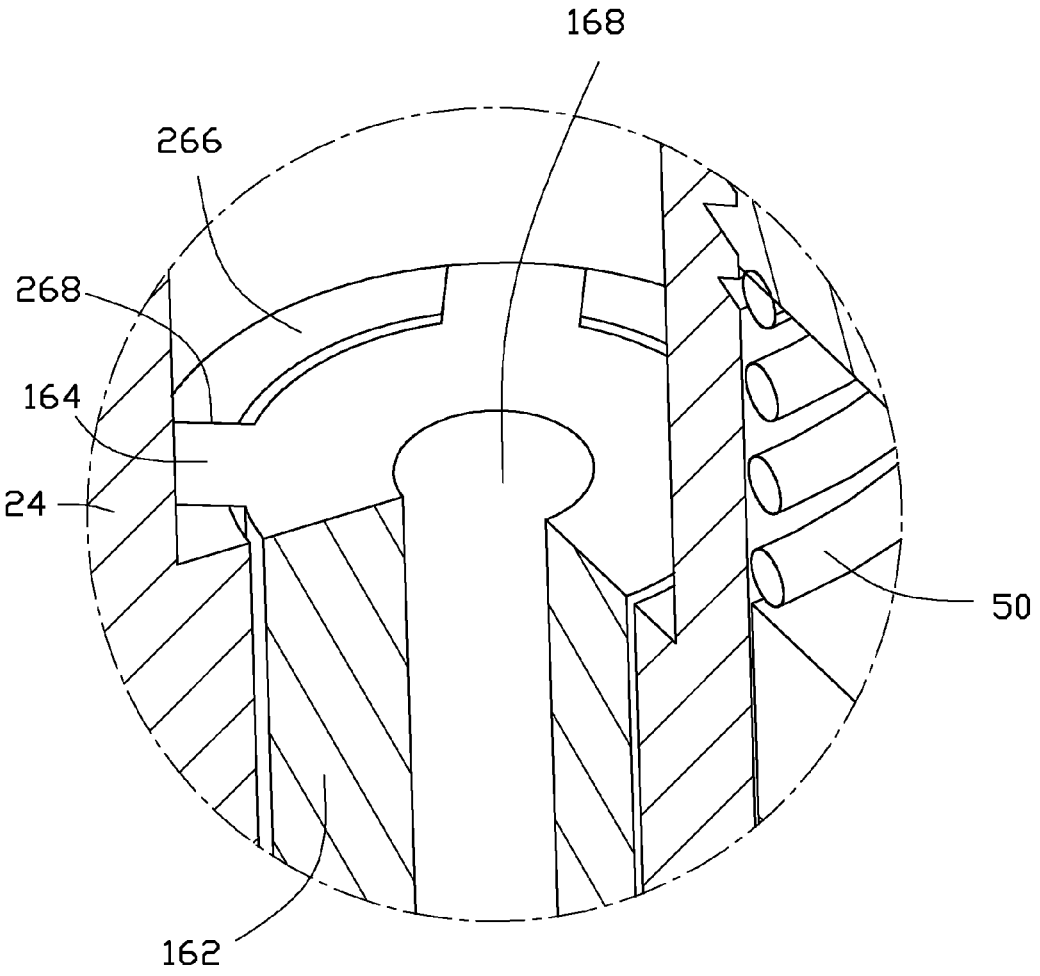

FIG. 7

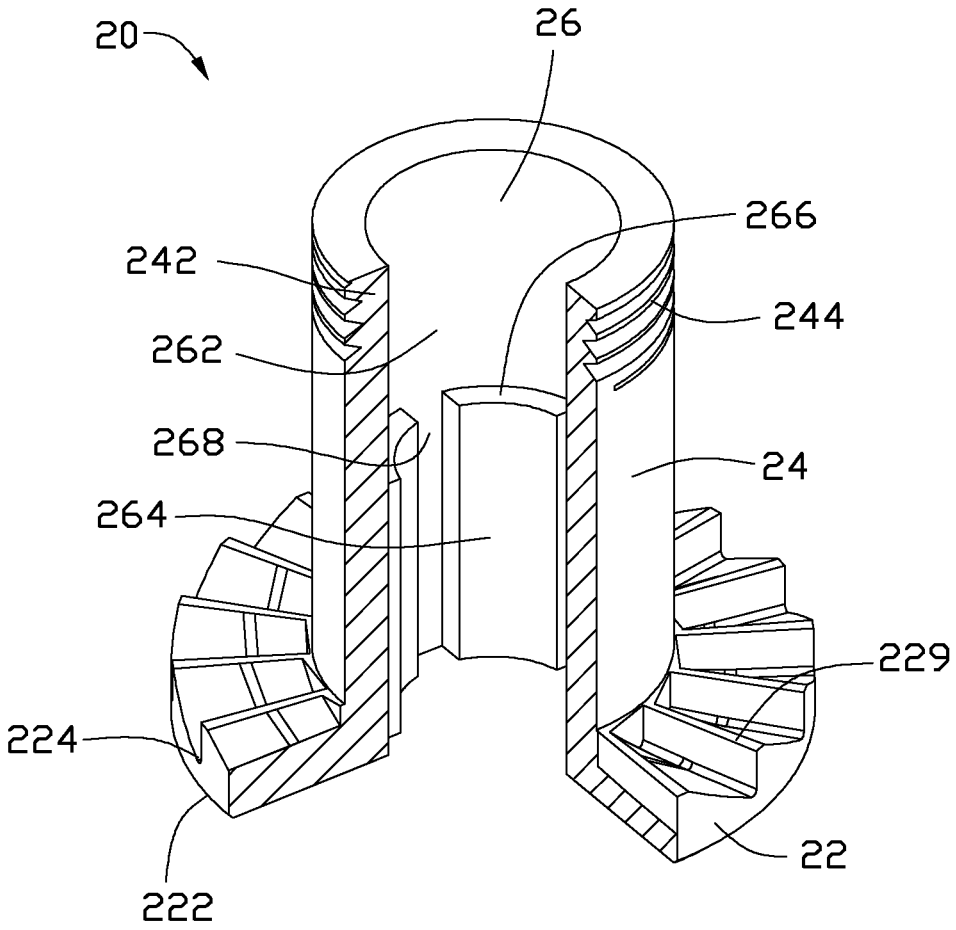

FIG. 8

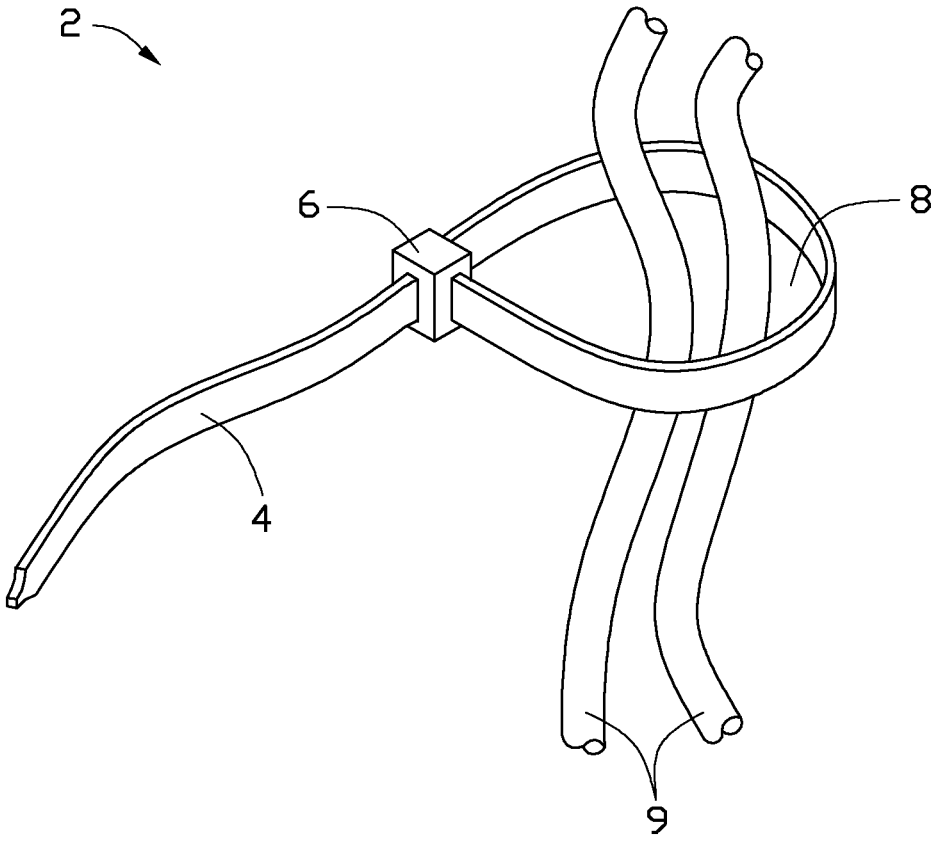

FIG. 9
(RELATED ART)

CABLE MANAGEMENT DEVICE

BACKGROUND

1. Technical Field

The present disclosure relates to a cable management device for winding a cable, wire or similar.

2. Description of Related Art

FIG. **9** shows a bunching device **2** which is used to gather and secure together a number of wires **9**. The bunching device **2** includes a cable tie **4** and a buckle **6**. One end of the cable tie **4** is fixedly connected to the buckle **6**, and the other end passes through the buckle **6** and is adjustably connected to the buckle **6**. Thereby, a binding ring **8** is formed. When in use, the wires **9** extend through the binding ring **8**, and the cable tie **4** is pulled relative to the buckle **6** to bunch the wires **9**. However, the bunching device **2** can only bunch the wires **9**, and the cable tie **4** must be cut to release the wires **9**. Therefore, the bunching device **2** cannot be reused. This is inconvenient and costly.

Therefore, it is desirable to provide a cable management device which can overcome or at least alleviate the above-mentioned problems.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. **1** is a schematic, isometric view of a cable management device according to an exemplary embodiment, the cable management device including a locking member, a winding member and a blocking member, and also showing a cable.

FIG. **2** is an exploded view of the cable management device and cable of FIG. **1**.

FIG. **3** is similar to FIG. **2**, but showing the cable management device and cable inverted.

FIG. **4** is essentially a cutaway view of the cable management device of FIG. **1**, wherein the winding member is in contact with the locking member.

FIG. **5** is similar to FIG. **4**, but showing the winding member separated from the locking member.

FIG. **6** is similar to FIG. **4**, but with the blocking member omitted.

FIG. **7** is an enlarged view of a circled section VII of FIG. **6**.

FIG. **8** is a cutaway view of the locking member of FIG. **2**.

FIG. **9** is a schematic view of a bunching device of related art, together with a number of wires.

DETAILED DESCRIPTION

FIGS. **1-3** show a cable management device **100** according to an exemplary embodiment. The cable management device **100** includes a base **10**, a locking member **20**, a winding member **30**, a driving member **40**, a spring **50**, a pressing member **60**, and a blocking member **70**. The cable management device **100** is substantially a cylinder, and is configured to gather and secure together a cable **90**, for example.

The base **10** includes a bottom board **12**, a peripheral side wall **14**, and a guide member **16**. The bottom board **12** is substantially circular. The side wall **14** perpendicularly extends from the bottom board **12** and surrounds the bottom board **12** to form a cylinder. Two through holes **142***a*, **142***b* and an opening **144** are defined in the side wall **14**. The two through holes **142***a*, **142***b* are located at diametrically opposite sides of the side wall **14** in this embodiment, and allow the cable **90** to pass through. The opening **144** is substantially rectangular. The guide member **16** perpendicularly extends

up from a central portion of the bottom board **12**, and is surrounded by the side wall **14**. The guide member **16** includes a main body **162** and four elongate, vertical protrusions **164**. The main body **162** is substantially a cylindrical rod with a circumferential surface **166**. The protrusions **164** extend from the circumferential surface **166**. The protrusions **164** perpendicularly connect the bottom board **12**. In this embodiment, the protrusions **164** are uniformly distributed around the circumferential surface **166**. A blocking hole **168** with internal threads (not labeled) is defined in the main body **162** along a longitudinal direction of the main body **162**.

FIGS. **1-3** and **7-8** show that the locking member **20** includes a pedestal **22**, and a sleeve **24** perpendicularly extending from a central portion of the pedestal **22**.

The pedestal **22** includes a first surface **222** and a second surface **224**. The first surface **222** and the second surface **224** are positioned at opposite sides of the pedestal **22**. The first surface **222** faces the bottom board **12**. A number of first sawteeth **229** are formed on the second surface **224**.

The sleeve **24** includes a top end **242** away from the pedestal **22**. External threads **244** are formed on an outer wall of the top end **242**. A stepped hole **26** is defined in the locking member **20** and axially passes through the sleeve **24** and the pedestal **22**. The stepped hole **26** includes a first receiving portion **262** and a second receiving portion **264**. The first receiving portion **262** is adjacent to the top end **242**, and the second receiving portion **264** is adjacent to the pedestal **22**. The inner diameter of the first receiving portion **262** is larger than that of the second receiving portion **264**, thereby an engagement surface **266** is formed at the junction of the first receiving portion **262** and the second receiving portion **264**. Four vertical grooves **268** are defined in an inner wall of the sleeve **24** at the second receiving portion **264**. In detail, the grooves **268** are parallel to a center axis of the locking member **20**, and pass through the engagement surface **266** and the first surface **222**. The length of each of the grooves **268** is substantially equal to the depth of the second receiving portion **264**. The depth of the grooves **268** is less than or equal to the difference between the radius of the first receiving portion **262** and the radius of the second receiving portion **264**, and each groove **268** receives a corresponding protrusion **164**. In this embodiment, the length of each of the protrusions **164** is larger than the length of each of the grooves **268**.

FIGS. **2-3** and **6** show that the winding member **30** includes a first end **32**, a second end **34**, and a winding portion **36**. The first end **32** and the second end **34** are positioned at opposite sides of the winding portion **36**. The first end **32**, the winding portion **36**, and the second end **34** cooperatively form a winding space **362**. A first receiving hole **38** is defined in a central portion of the winding member **30**. The first receiving hole **38** axially passes through the first end **32**, the winding portion **36**, and the second end **34**. The first receiving hole **38** receives the sleeve **24**.

The first end **32** includes a third surface **322** and a fourth surface **324**. The third surface **322** and the fourth surface **324** are on the same side of the winding member **30**, and are both ring-shaped. The fourth surface **324** surrounds the first receiving hole **38**, and the third surface **322** can be considered to surround the fourth surface **324**. The fourth surface **324** is recessed relative to the third surface **322**. A number of second sawteeth **329** are formed on the fourth surface **324**. The second sawteeth **329** mesh with the first sawteeth **229** when the fourth surface **324** is in contact with the second surface **224**.

The second end **34** includes a fifth surface **342**. The fifth surface **342** and the fourth surface **324** are at the opposite sides of the winding member **30**, with the fifth surface **342** being at the second end **34**, and the fourth surface **324** being

nearer the first end **32**. A number of third sawteeth **349** are formed on the fifth surface **342**. A hook **364** is formed on the winding portion **36** and is positioned in the winding space **362**. The hook **364** hooks the cable **90**.

The driving member **40** includes a plate **42**, an outer barrel **44**, an inner barrel **46** and a number of fourth sawteeth **48**.

The plate **42** is substantially circular, and includes a lower surface **422** and an upper surface **424**. The lower surface **422** and the upper surface **424** are positioned at opposite sides of the plate **42**, and the lower surface **422** is substantially parallel to the upper surface **424**. A second receiving hole **426** is axially defined in the plate **42** and extends from the lower surface **422** to the upper surface **424**. The second receiving hole **426** is positioned at a central portion of the plate **42**.

The outer barrel **44** perpendicularly extends from the upper surface **424** and surrounds the second receiving hole **426**. The outer barrel **44** includes an outer side surface **442**. A number of knurls **444** are formed on the outer side surface **442**.

The inner barrel **46** perpendicularly extends from the upper surface **424**. The inner barrel **46** is received in the outer barrel **44** and surrounds the second receiving hole **426**. The outer barrel **44**, the inner barrel **46**, and the plate **42** cooperatively form a ring-shaped groove **47**. The height of the inner barrel **46** is larger than that of the outer barrel **44**.

The fourth sawteeth **48** are formed on the lower surface **422**. The fourth sawteeth **48** mesh with the third sawteeth **349**. In this embodiment, the first sawteeth **229**, the second sawteeth **329**, the third sawteeth **349** and the fourth sawteeth **48** are all tilted. That is, each of the first, second, third and fourth sawteeth **229**, **329**, **349**, **48** is non-symmetrical about a vertical centerline of a vertical cross-section thereof. The first sawteeth **229** and the third sawteeth **349** are tilted in two contrary directions, namely a second direction and an opposite first direction, respectively. The second sawteeth **329** and the fourth sawteeth **48** are tilted in two contrary directions, namely the first direction and the second direction, respectively. Thus, the first sawteeth **229** tilted in the second direction mesh with the second sawteeth **329** tilted in the first direction, and the third sawteeth **349** tilted in the first direction mesh with the fourth sawteeth **48** tilted in the second direction. Accordingly, the driving member **40** can rotate the winding member **30** in the second direction, but cannot rotate the winding member **30** in the first direction. In this embodiment, the first direction is counterclockwise (arrow Y shown in FIG. **5**), and the second direction is clockwise (arrow X shown in FIG. **5**).

The pressing member **60** is substantially ring-shaped. A threaded hole **62** with internal threads **622** is axially defined in a central portion of the pressing member **60**, and passes through the pressing member **60**. The internal threads **622** engage with the external threads **244**.

The spring **50** includes an upper end **52** and a lower end **54**. The upper end **52** and the lower end **54** are positioned at opposite top and bottom sides of the spring **50**.

The blocking member **70** is typically a bolt, and includes a cap **72** and a rod **74**. The cap **72** is substantially circular. The diameter of the cap **72** is larger than the inner diameter of the second receiving portion **264**, but is slightly less than the inner diameter of the first receiving portion **262**. The rod **74** perpendicularly extends from the cap **72**.

In assembly of the cable management device **100**, the locking member **20** is sleeved on the guide member **16**. In detail, the main body **162** is received in the second receiving portion **264**. The four protrusions **164** engage in the four grooves **268**. Therefore, the locking member **20** cannot be rotated relative to the guide member **16**, but can move along the longitudinal direction of the protrusions **164**. The winding member **30** is sleeved on the sleeve **24**. In detail, the sleeve **24** passes through the first receiving hole **38** and extends outward from the first receiving hole **38**. The third surface **322** contacts the bottom board **12**, and a receiving space **39** is formed between the fourth surface **324** and the bottom board **12**. The pedestal **22** is received in the receiving space **39**. The second surface **224** contacts the fourth surface **324**, and the second sawteeth **329** mesh with the first sawteeth **229**. The height of the receiving space **39** is greater than the thickness of the pedestal **22**, so that the pedestal **22** can move up and down in the receiving space **39**. The driving member **40** is sleeved on the top end **242** of the sleeve **24** that extends out of the first receiving hole **38**, and sits on the winding member **30**. In detail, the sleeve **24** is inserted into the second receiving hole **426**. The lower surface **422** faces the fifth surface **342**, and the third sawteeth **349** mesh with the fourth sawteeth **48**. The outer barrel **44** rests on a top surface **140** of the side wall **14**. The spring **50** is sleeved on the sleeve **24** and is received in the inner barrel **46**. The pressing member **60** is fixedly connected to the top end **242** via the external threads **244** engaging with the internal threads **622**.

In this situation, the lower end **54** of the spring **50** contacts the upper surface **424** of the plate **42**, and the upper end **52** of the spring **50** contacts the pressing member **60**. The spring **50** is compressed and applies a force to the pressing member **60** to make the first sawteeth **229** mesh with the second sawteeth **329** in an initial state of the cable management device **100**. In this embodiment, the pressing member **60** seals the space between the sleeve **24** and the inner barrel **46** and thus dust and other impurities are kept out. The rod **74** engages in the blocking hole **168**, and the cap **72** abuts against the engagement surface **266** and a top surface of the guide member **16**. In the cable management device **100**, the ring-shaped groove **47** supplies a space for an installation tool during assembling of the cable management device **100**. The knurls **444** increase friction force when a user or a tool rotates the driving member **40**. The blocking member **70** locks the various elements including the base **10**, the locking member **20**, the winding member **30**, the driving member **40**, the spring **50**, and the pressing member **60** together, and restricts the range of movement of the locking member **20** along the guide member **16**.

In the initial state of the cable management device **100**, the third sawteeth **349** mesh with the fourth sawteeth **48**, and the spring **50** is compressed and applies a force to the pressing member **60** to make the first sawteeth **229** mesh with the second sawteeth **329**. A user grips the knurls **444**, and the driving member **40** is rotated with the winding member **30** along the second direction, to wind the cable **90** around the winding portion **36**. However, the cable **90** cannot be drawn by the user to the outside of the cable management device **100** along the first direction because of the meshing of the first sawteeth **229** and the second sawteeth **329**. Then when a downward pressing force is applied to the pressing member **60** by the user, the locking member **20** moves down to separate the first sawteeth **229** from the second sawteeth **329**. In this situation, the winding member **30** can be rotated freely. Therefore, the cable **90** can be drawn by the user to the outside of the cable management device **100** along the first direction. When the pressing force is released, the spring **50** lifts the pressing member **60**, and the first sawteeth **229** again mesh with the second sawteeth **329**. During winding of the cable **90**, the first sawteeth **229** are separated from the second sawteeth **329**. That is, the locking member **20** does not block the rotation of the winding member **30**. Therefore, it is convenient to wind and to unwind the cable **90**.

The cable management device **100** can be easily assembled and disassembled due to its simple configuration. Furthermore, the cable management device **100** can be repeatedly used, and so can reduce costs.

Although numerous characteristics and advantages of the present embodiments have been set forth in the foregoing description, together with details of the structures and functions of the embodiments, the disclosure is illustrative only, and changes may be made in detail, especially in the matters of shape, size, and the arrangement of parts within the principles of the disclosure to the full extent indicated by the broad general meaning of the terms in which the appended claims are expressed.

What is claimed is:

1. A cable management device comprising:

a base comprising a bottom board, a guide member perpendicularly extending from a central portion of the bottom board, and a plurality of protrusions formed on the guide member;

a locking member comprising a pedestal, a sleeve perpendicularly extending from a central portion of the pedestal, and a stepped hole defined axially passing through the sleeve and the pedestal, wherein the stepped hole comprises a first receiving portion and a second receiving portion, a plurality of grooves are defined in an inner wall of the sleeve at the second receiving portion, a first surface and a second surface are defined on opposite sides of the pedestal, the grooves slidably receive the protrusions, the first surface faces the bottom board, and a plurality of first sawteeth are formed on the second surface;

a winding member comprising a first end, a second end, a winding portion positioned between the first end and the second end, and a first receiving hole axially defined and passing through the first end, the winding portion and the second end, wherein the first receiving hole has the sleeve moveably received therein, the first end comprises a third surface and a fourth surface, the fourth surface surrounds the first receiving hole and is generally surrounded by the third surface, the third surface contacts the bottom board, a plurality of second sawteeth are formed on the fourth surface, a receiving space is formed between the fourth surface and the bottom board, a height of the receiving space is greater than a thickness of the pedestal, the pedestal is movably received in the receiving space, and the second end comprises a fifth surface on which a plurality of third sawteeth are formed;

a driving member comprising a plate and a number a plurality of fourth sawteeth, wherein the plate comprises a lower surface and an upper surface positioned at opposite sides thereof, a second receiving hole is axially defined in a central portion of the plate and extends from the lower surface to the upper surface, and the fourth sawteeth are formed on the lower surface;

a pressing member connected to a top end of the sleeve, wherein the top end of the sleeve is away from the pedestal; and

a spring sleeved on the sleeve and compressed between the pressing member and the driving member.

2. The cable management device of claim **1**, wherein the guide member comprises a main body which is substantially a cylindrical rod with a circumferential surface, and the protrusions extend from the circumferential surface and perpendicularly connect the bottom board.

3. The cable management device of claim **1**, wherein the inner diameter of the first receiving portion is larger than the inner diameter of the second receiving portion, and an engagement surface is formed on an inside of the locking member at the junction of the first receiving portion and the second receiving portion.

4. The cable management device of claim **3**, further comprising a blocking member, wherein a blocking hole is formed in the guide member for receiving the blocking member.

5. The cable management device of claim **4**, wherein the blocking member comprises a cap and a rod, a diameter of the cap is larger than the inner diameter of the second receiving portion but less than the inner diameter of the first receiving portion, and the rod is engaged in the blocking hole with the cap abutting against the engagement surface and a top end of the guide member.

6. The cable management device of claim **3**, wherein the grooves pass through the engagement surface and the first surface, a length of each of the grooves is equal to a depth of the second receiving portion, and a depth of each of the grooves is less than or equal to the difference between the radius of the first receiving portion and the radius of the second receiving portion.

7. The cable management device of claim **6**, wherein a length of each of the protrusions is larger than the length of each of the grooves, and the locking member can move along a longitudinal direction of the protrusions.

8. The cable management device of claim **1**, wherein the base further comprises a peripheral side wall perpendicularly extending from and surrounding the bottom board, and two through holes allowing a cable to pass through are defined in the side wall.

9. The cable management device of claim **1**, wherein the first end, the winding portion, and the second end cooperatively form a winding space.

10. The cable management device of claim **9**, wherein a hook is formed on the winding portion and positioned in the winding space, and an opening which can expose the hook is formed on the side wall.

11. The cable management device of claim **1**, wherein the driving member further comprises an outer barrel with an outer side surface, the outer barrel perpendicularly extends from the upper surface and surrounds the second receiving hole, and a number of knurls are formed on the outer side surface.

12. The cable management device of claim **11**, wherein the driving member further comprises an inner barrel received in the outer barrel and surrounding the second receiving hole, and the outer barrel, the inner barrel and the plate cooperatively form a ring-shaped groove.

13. The cable management device of claim **1**, wherein external threads are formed surrounding the top end of the sleeve, a threaded hole with internal threads is axially defined in a central portion of the pressing member, the pressing member is connected to the top end of the sleeve, and the internal threads engage with the external threads.

14. The cable management device of claim **1**, wherein the first sawteeth mesh with the second sawteeth, the third sawteeth mesh with the fourth sawteeth, the first sawteeth, the second sawteeth, the third sawteeth, and the fourth sawteeth are all tilted, the first sawteeth and the third sawteeth are tilted in two contrary directions, and the second sawteeth and the fourth sawteeth are tilted in two contrary directions.

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